

PUB-NO: WO003048443A1

DOCUMENT-IDENTIFIER: WO 3048443 A1

TITLE: A HOUSEHOLD APPLIANCE

PUBN-DATE: June 12, 2003

INVENTOR-INFORMATION:

NAME	COUNTRY
KURAL, CEM	TR
ELMAS, SERDAL	TR

ASSIGNEE-INFORMATION:

NAME	COUNTRY
ARCELIK AS	TR
KURAL CEM	TR
ELMAS SERDAL	TR

APPL-NO: TR00100063

APPL-DATE: December 6, 2001

PRIORITY-DATA: TR00100063W (December 6, 2001)

INT-CL (IPC): D06F058/26, F26B003/347

EUR-CL (EPC): D06F058/26 ; F26B003/347

ABSTRACT:

A household appliance (1) e.g a washer-dryer, comprises an enclosure (2) into which objects to be heated are placed, a magnetron (4) for generating microwaves, a waveguide (3) for feeding the generated microwave into the enclosure, an arc detector (5) coupled to the waveguide (3) for detecting the arcing within the enclosure (2) and a control unit (6).

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
12 June 2003 (12.06.2003)

PCT

(10) International Publication Number
WO 03/048443 A1

(51) International Patent Classification: **D06F 58/26,**
F26B 3/347

(21) International Application Number: PCT/TR01/00063

(22) International Filing Date: 6 December 2001 (06.12.2001)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant (for all designated States except US): ARÇELİK A.S. [TR/TR]; AR-GE Dept., E5 Ankara Asfaltı Üzeri, Tuzla, 81719 İstanbul (TR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): KURAL, Cem [TR/TR]; Arçelik A.S., E5 Ankara Asfaltı Üzeri, Tuzla, 81719 İstanbul (TR). ELMAS, Serdal [TR/TR]; Arçelik A.S., E5 Ankara Asfaltı Üzeri, Tuzla, 81719 İstanbul (TR).

(74) Agent: ANKARA PATENT BUREAU LTD.; Sehit Adem Yavuz Sokak 8/22, Kizilay, 06440 Ankara (TR).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

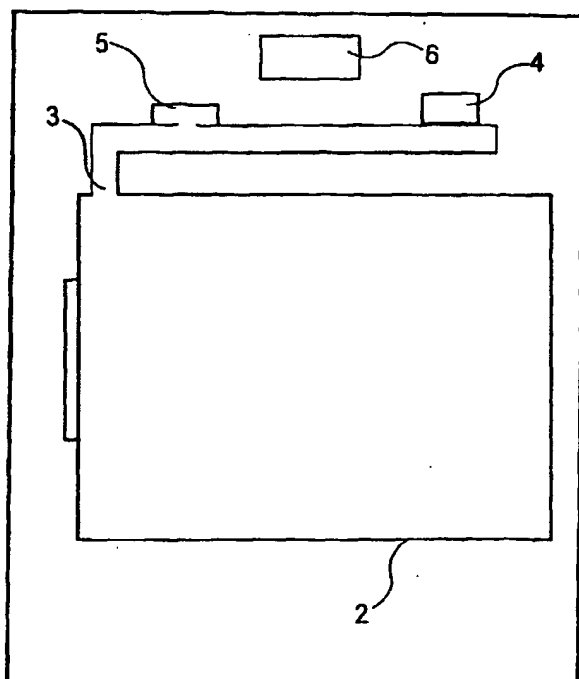
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A HOUSEHOLD APPLIANCE



(57) Abstract: A household appliance

(1) e.g. a washer-dryer, comprises an enclosure (2) into which objects to be heated are placed, a magnetron (4) for generating microwaves, a waveguide (3) for feeding the generated microwave into the enclosure, an arc detector (5) coupled to the waveguide (3) for detecting the arcing within the enclosure (2) and a control unit (6).



WO 03/048443 A1

A HOUSEHOLD APPLIANCE

5

The present invention relates to a household appliance especially a washer/dryer which utilizes microwave heating safely.

10

Household appliances wherein microwave energy is used for heating objects, for example heating fabrics in dryers, is well known in prior art. The major drawback of heating by using microwave energy is the occurrence of arcs which is an electrical breakdown phenomena caused between two conductors such as metal zippers, buttons, small metal objects that clothing may have. Arcs may cause the objects to melt or burn. Studies have been made to prevent arcing around the metallic structures inside the enclosure where microwave fields are applied.

15

US 5325600 features a UV tube detector placed in proximity to the clothing for sensing a resonant arcing condition; but it is not an easy way for sensing and mounting in a turning drum and leads to a lot of constructional problems.

20

US 5321897 provides a means for eliminating the risk of arcing by sensing the temperature of the exhaust air; but it is a risky way of eliminating arcing since arcing may occur although temperature sensed in the exhaust duct is low in the microwave permeable drum.

25

WO 93/13635 provides an arc detector mounted in a wall of the dryer chamber to detect arcing in a microwave permeable drum and a method for monitoring electric field strength within the chamber and providing an output signal in the event of a sudden decrease in the field strength due to arcing.

30

EP 0088175 provides an output for the microwave power means which is arranged to protect such power means from abnormally reflected power but it does not provide any means for arc detection.

35

WO 01/57457 discloses an arc detector that is placed onto the waveguide for measuring the reflected power. Since reflected power is measured, an isolator is placed for isolating the arc detector from the forward power which is a very expensive solution.

40

The object of the invention is to provide a household appliance, especially a washer/dryer, utilising microwave heating, , comprising an arc detector for detecting arcing during microwave heating of objects namely clothing.

45

An embodiment of the household appliance realized in order to attain the object of the present invention is illustrated in the attached drawings, wherein:

Figure 1 - is a schematic view of the household appliance.

Figure 2 - is a schematic view of the arc detector.

5 The components shown in the drawings have been numerated as follows:

1. Household appliance
2. Enclosure
3. Waveguide
- 10 4. Magnetron
5. Arc detector
6. Control unit
7. Antenna
8. Microwave diode
- 15 9. Filtering means
10. Slot
11. Casing
12. Capacitor
13. Ferrite component

20

A household appliance (1), especially a washer-dryer, comprises an enclosure (2) into which objects to be heated, such as clothing, are placed, a magnetron (4) for generating microwaves, a waveguide (3) for feeding the generated microwave into the enclosure (2), an arc detector (5) coupled to the waveguide (3) for detecting the arcing within the enclosure (2) and a control unit (6).

25

The waveguide (3) and the arc detector (5) comprise slots (10). The arc detector (5) is coupled to the waveguide (3) in such a way that slots (10) coincide and get the signal representing the field inside the waveguide (3) into the arc detector (5) from the waveguide.

30

The arc detector (5) also comprises an antenna (7) to capture the signal, a filtering means (9), preferably comprising a capacitor (12) and/or a ferrite element component (13), to filter the noise on the antenna (7), a microwave diode (8) to rectify the signal and a casing (11) for protecting all the components of the arc detector (5) from the noise and to avoid any microwave leakage.

35

The arc detector (5) is preferably mounted with an inclination onto the waveguide (3) to get the desired signal efficiently. The arc detector (5) is mounted on the waveguide (3) in a position depending on the guided wavelength of the waveguide (3) and the total impedance of the household appliance (1).

40

During the operation of the household appliance (1), the objects that are placed within the enclosure (2) are heated by using microwave energy. During the microwave heating of objects, the electric field within the waveguide (3) and the enclosure (2) changes gradually if arcs do not occur. However, electric field changes abruptly if any arc occurs inside the enclosure (2). The arc detector (5)

45

- measures electric field values and sends a signal representing the electric field values to the control unit (6). The control unit (6) has any means of signal comparison which compares the input signal coming from the detector (5) on the waveguide (3) with the predetermined reference signal that simulates the non –
- 5 arcing condition. If control unit (6) has an input signal which differs from the predetermined amount, microwave power is decreased and the arc detector (5) continues to monitor electric field. If arcing continues at this second stage in which power is reduced, microwave power is interrupted.

CLAIMS:

- 5 1. A household appliance (1), especially a washer-dryer, including an enclosure (2) into which objects to be heated are placed, a magnetron (4) for generating microwaves, a waveguide (3) for feeding the generated microwave into the enclosure (2), an arc detector (5) for detecting the arcing within the enclosure (2) and a control unit (6), characterized in that the arc detector (5) comprises an antenna (7) to capture the signal
10 representing the field inside the waveguide (3), a filtering means (9) to filter the noise on the antenna (7), a microwave diode (8) to rectify the signal and a casing (11), for protecting all the components of the arc detector (5) from the noise and to avoid any microwave leakage.
- 15 2. A household appliance (1) as claimed in claim 1, characterized in that the waveguide (3) and the arc detector (5) comprise slots (10) and the arc detector (5) is coupled to the waveguide (3) in such a way that slots (10) coincide and get the signal into the arc detector (5) from the waveguide.
- 20 3. A household appliance (1) as claimed in claims 1 and 2, characterized in that the detector (5) is mounted with an inclination onto the waveguide (3) to get the desired signal efficiently.
- 25 4. A household appliance (1) as claimed in claims 1 to 3, characterized in that the filtering means (9) comprises a capacitor (12) and/or a ferrite component (13).

1 / 1

Figure 1

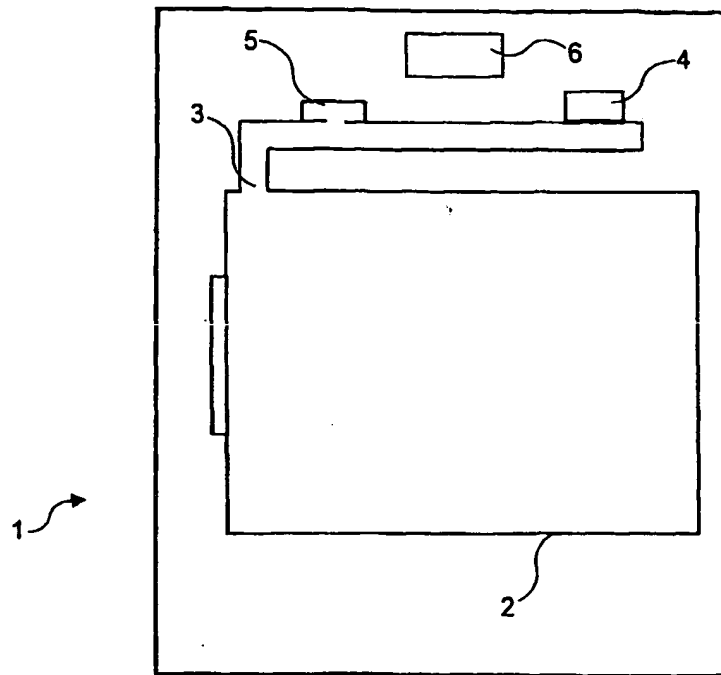
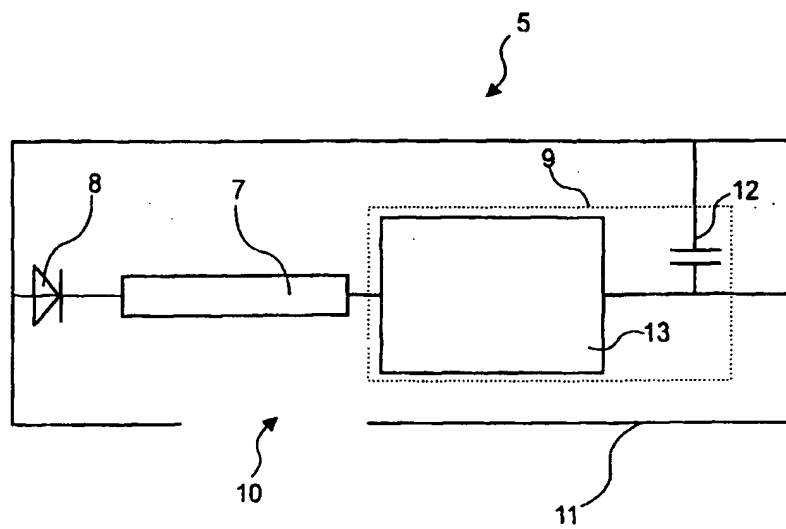


Figure 2



INTERNATIONAL SEARCH REPORT

Internat Application No

PCT/TR 01/00063

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 D06F58/26 F26B3/347

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 D06F F26B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 01 57457 A (ARCELIK A.S.) 9 August 2001 (2001-08-09) cited in the application abstract; figure 1	1
A	WO 93 13635 A (ELECTRIC POWER RESEARCH INSTITUTE INC.) 8 July 1993 (1993-07-08) cited in the application abstract; figures	1
A	US 5 325 600 A (MICRO DRY INC.) 5 July 1994 (1994-07-05) cited in the application abstract; figure 1	1
	-/--	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

G document member of the same patent family

Date of the actual completion of the international search

7 August 2002

Date of mailing of the international search report

16/08/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Courrier, G

INTERNATIONAL SEARCH REPORT

Interl Inal Application No
PCT/TR 01/00063

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 606 804 A (ELECTRIC POWER RESEARCH INSTITUTE) 4 March 1997 (1997-03-04) column 2, line 40 - line 44; claims 1,2; figure 1	1
A	US 4 431 965 A (THE NARDA MICROWAVE CORPORATION) 14 February 1984 (1984-02-14) abstract; figures	1

INTERNATIONAL SEARCH REPORT
Information on patent family members

Interl mal Application No
PCT/TR 01/00063

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0157457	A	09-08-2001	WO 0157457 A1	09-08-2001
			AU 3853900 A	14-08-2001
WO 9313635	A	08-07-1993	US 5270509 A	14-12-1993
			DE 4294618 T0	07-03-1996
			MX 9207497 A1	01-06-1993
			SE 505853 C2	13-10-1997
			SE 9302713 A	14-10-1993
			WO 9313635 A1	08-07-1993
US 5325600	A	05-07-1994	US 5424515 A	13-06-1995
US 5606804	A	04-03-1997	NONE	
US 4431965	A	14-02-1984	NONE	